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Cyclicality of SME Financing in Canada

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Small Business Branch
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Abstract

This paper quantifies and assesses the relationship between the business cycle, as measured by the output gap, and chartered bank loans to small, medium-sized and large businesses using aggregate data from the Bank of Canada's *Banking and Financial Statistics* Database combined with National Account and financial market data covering the 1988 to 2012 period. The findings show that lending is cyclically sensitive for all business size categories; however, contrary to what some might expect, loans to large businesses were found to be more sensitive to the business cycle than loans to small and medium-sized businesses. This softening of the impact of the business cycle may result from government assistance programs that are specifically aimed at improving small and medium-sized business access to financing during downturns or periods of tight credit conditions that are not available for large businesses. The data also produced conflicting evidence regarding which macro-variables influence loan levels and the strength of those variables. Finally, separate data focusing on the Business Development Bank of Canada showed that this instrument of public policy can be effective in softening the impact of cyclical downturns on small business access to financing.

I. Introduction

It has long been assumed that lending to businesses in Canada is pro-cyclical, i.e., lending is positively related to the business cycle. When the economy is doing well, gross domestic product (GDP) growth rises, unemployment falls, default risks fall and lender underwriting standards loosen. At these times, access to credit for borrowers improves. When the economy is doing poorly, GDP growth falls, unemployment rises, default risks rise and lender underwriting standards tighten. At these times, access to credit for borrowers worsens. (If the economy is doing really poorly, lenders might tighten their underwriting standards and ration credit by so much that an overall capital shortage develops throughout the economy (OECD, 2006).) Tight lending conditions persist until the economy recovers and default risks fall, at which point the cycle starts again.

It is possible that this cyclical nature of business lending has a more disadvantageous effect on certain types of businesses. Policy discussions in this context frequently surround small and medium-sized enterprises (SMEs), i.e., in discussions it is often argued that lending conditions for SMEs are more sensitive to changes in economic activity than for large businesses. The hypothesis is that, because under normal market conditions SMEs already face relatively greater difficulties accessing financing, or affordable sources of financing, they will face even greater difficulties when the economy slows (Carbó-Valverde et al., 2008). However, current literature does not quantify the degree of sensitivity across business size categories in Canada.

The main purpose of this study, therefore, is to quantify this sensitivity so that specific information is available for policy-makers. This assessment is particularly important in light of the recent global financial crisis as lending conditions changed dramatically over that period. It is made possible through the use of data from the Bank of Canada's *Banking and Financial Statistics* Database (BFSD) combined with National Account and financial market data covering the 1988 to 2012 period. Using the BFSD data, it was possible to build an autoregressive distributed lag model to better assess the dynamic relationship among business lending, bank profitability, national savings rates, changes in the business cycle and other variables.

The analysis begins with a literature review in Part II. In Part III, the empirical framework for regression analysis is outlined. Correlation analysis, results of the regression analysis and a brief discussion of policy measures used to counterbalance loan cyclicality are explored in Part IV. Lastly, the main conclusions are summarized in Part V.

II. Literature Review

Freidrich A. Hayek's Austrian business cycle theory is often regarded as the main precursor to modern credit cycle theory. Hayek's theory contended that fluctuations in economic activity were primarily the result of fluctuations in lending activity (Hayek, 1931). According to Hayek, the growth phase of the business cycle started with low interest rates. This stimulated bank borrowing and personal and business investment. More frequently than not, interest rates would remain abnormally low for too long relative to the scale of production, which would result in a credit bubble. Excessive credit creation, fuelled by the money multiplier process, would then lead to an economic expansion coupled with a widespread misallocation of financial resources. Poor returns and increased defaults would eventually cause lenders to cut their loans, possibly leading to a credit crunch. This would then trigger a shock and contraction in economic activity.

Work produced by McCulley (2009) paralleled those of Hayek. McCulley attributed changes in business lending to behavioural factors and, in particular, changes in lenders' appetites towards risk. McCulley explained that swings in risk appetite were what ultimately determined the pro-cyclicality of lending in the formal banking system and that these changes helped steer the business cycle. McCulley's argument was founded on the Minsky (1992) "financial instability hypothesis." This hypothesis states that stability is inherently destabilizing because prolonged periods of stability result in the expectation of further periods of stability in the future, which results in overconfidence and higher risk loan arrangements between borrowers and lenders. The more stable the economy and the longer it lasts, the more unstable the foundation for the economy becomes. This is consistent with Herring and Santomero (2008) and

Berger and Udell (2002), who argue that lenders face institutional memory problems, i.e., over long periods of economic stability lenders neglect or forget how to properly evaluate risk. Consequently, they start underestimating the probability of a shock. This probability increases the more time that passes since the last time the lender faced significant credit losses. Stability, therefore, is destabilizing in that it results in an underestimate of risk and encourages higher risk loan structures that cannot be supported long term. Once loan arrangements are stretched to excess and losses start to accumulate, lenders stop making loans, the credit cycle reverses and the economy slips into recession.

In contrast to Austrian business cycle theory, which treats the credit cycle as the main cause of the business cycle, modern credit cycle theory views the credit cycle as a possible cause, but more often than not an effect, of the business cycle. In modern credit cycle theory the upswing in the business cycle is led primarily by an increase in consumer and business confidence, sales, production and capacity use and/or a decline in unemployment (Calverley et al., 2011). This is usually accompanied by stimulatory government policies in the form of lower interest rates and a budgetary deficit. Price levels also remain low or fall at the early stage of the business cycle. These improved conditions cause a natural increase in the demand for credit as businesses start to expand. Credit availability also improves as risks—default, repayment and collateral risks—are reduced for financial institutions (Mouatt, 2011). Lower risks for lenders translate into looser underwriting standards, a greater willingness to lend and an upswing in the credit cycle. At some point the economy slows, frequently under the impact of rising interest rates or a shock in resource prices. Sales, asset values and incomes usually deteriorate. Businesses face more difficulties making loan payments and defaults and bankruptcies start to rise. This both reduces the demand for credit and increases the lending risk to financial institutions. This is preceded by higher underwriting standards and a decline in the available supply of funds, which could work to amplify the downward effects of the business cycle (Kiyotaki and Moore, 1997). The downswing in the credit cycle typically continues until the economy shows signs of recovery reducing the risks to lenders, at which point both the business and credit cycles start to rise again.

In 2002, Bikker and Hu conducted a study for the De Nederlandsche Bank on cyclical patterns in business lending. In this study they analyzed at a national level, among other things, the interaction between business cycles and lending practices for 26 industrial countries, including Canada. Demand and supply variables assessed in their analysis included GDP growth, the money supply, bank capital and reserves, bank profits and other bank-specific factors (e.g., profit margins). The study aimed to assess which variables caused bank lending to fluctuate over time. Results of the study showed that lending was statistically significantly related to GDP growth. More specifically, lending at over six percent GDP growth was approximately 2.5 times higher than at approximately zero GDP growth. Changes in the money supply were also found to be statistically significant. By contrast, the capitalization level of banks and reserves was not found to be statistically significant. Bank profitability was statistically significant, especially when modelled with a lag. When bank profitability doubled, lending, they claimed, would eventually increase by about 50 percent.

In 2006, the Tinbergen Institute conducted an econometric study to assess the relationship among credit cycles, business credit ratings, GDP growth, the money supply, inflation, credit quality spreads and various other financial market variables. The study showed that cyclicality in credit scoring, given the proliferation in credit scoring models used by banking institutions, accentuated the pro-cyclical nature of the credit cycle (Koopman et al., 2006), i.e., when credit scoring models were erroneously pessimistic during economic downturns, which they often were, even some of the best credit quality borrowers would not be able to access financing at that time, further pushing the credit and business cycles downwards.

Similar results were drawn in a 2007 study conducted by the National Bank of Belgium. The study reports that when economic conditions are depressed and lenders' tolerance for risk is low, information asymmetries result in borrowers with positive net present value projects not being able to access financing. Alternatively, the opposite can occur when the economy booms. It is argued that loan cyclicality in business lending is likely more pronounced among borrowers whose lender–borrower relationships are plagued by asymmetric information problems, namely SMEs (Masschelein, 2007).

Further in the area of SME lending, the European Commission's Directorate-General for Enterprise and Industry conducted a study in 2009 on loan cyclicality. The analysis applied to a range of European countries over the 1996–2007 period: Austria, Belgium, Finland, France, Germany, Hungary, Italy, Poland, Spain and the United Kingdom. The main relationship of interest was the effect of the business cycle on the supply of financing to SMEs. Additional variables that affect the supply and demand of SME financing were considered, including central government surplus, real interest rates, investment rates, the solvency of enterprises and the solvency of banks. In performing the econometric analysis, different model variants were tested. In the full variation of the model all countries were included. Regression results for bank loans to small businesses produced no significant results, i.e., lending to small businesses did not appear to be cyclical, nor was it statistically significantly related to any of the other variables (Ruis et al., 2009). This raised questions regarding which macro-variables affected small business lending.

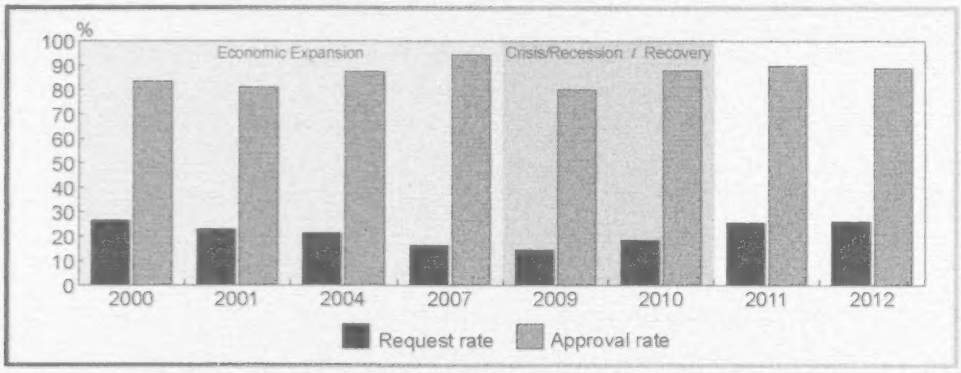
A second variation of the model that excluded Hungary and Belgium from the dataset did support loan cyclicality in small business lending with a one-year lag. It was estimated that a one-percent increase in GDP growth would increase bank loans to small businesses by about two percent, with the effect emerging within one year. Once again, no other model variables had a significant influence.

For medium-sized businesses, the full variation of the model produced a statistically significantly positive relationship between lagged GDP growth and business lending. The rest of the variables were insignificant. By removing those variables, it was shown that a one-percent increase in GDP growth would cause bank loans to medium-sized businesses to increase by about three percent, with the positive effects of an increase in the business cycle not occurring for about one year. Comparing these results with those of small businesses, it was argued that the cyclicality of bank loans to businesses was stronger for medium-sized businesses than for small businesses, contrary to what some might expect, i.e., not only was the lagged effect of GDP growth on loans to medium-sized businesses cyclical for the whole sample of countries instead of only a subgroup of countries, the coefficient was also much larger.

Regarding SME lending in Canada, Statistics Canada's *Survey on Financing of Small and Medium Enterprises* and Industry Canada's *Credit Conditions Survey* provide some indication of loan cyclicality patterns for different sized firms since 2000. This can be seen through an assessment of small business debt financing request rates and approval rates. Request rates measure the percentage of businesses that requested financing in a given year. Approval rates measure the percentage of businesses whose requests for financing were approved.

Consistent with expectations, the supply of debt financing displays some cyclical elements (Figure 1), with approval rates declining in 2001 following bursting of the information technology (IT) bubble and the 9/11 attacks, rising between 2004 and 2007, falling during the 2009 recession and rebounding with the economy in 2010.

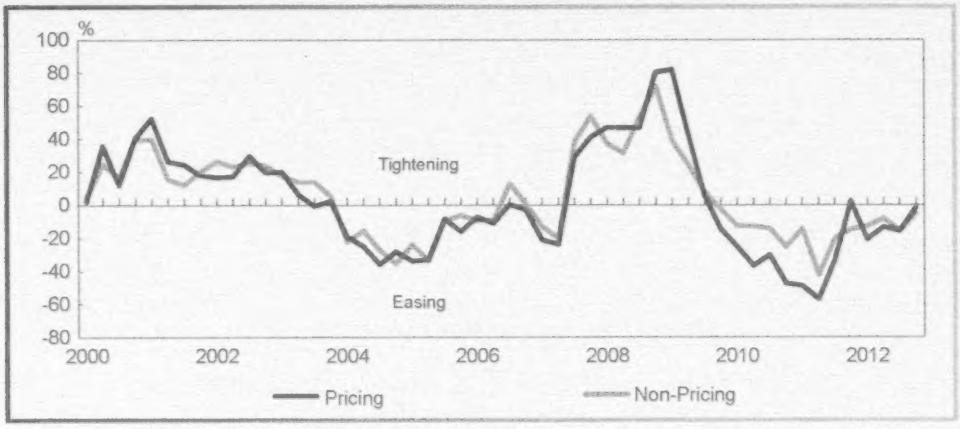
Figure 1: Debt financing request and approval rates



Sources: Industry Canada, *Credit Conditions Survey*, 2009, 2010 and 2011; Statistics Canada, *Survey on Financing of Small and Medium Enterprises*, 2000, 2001, 2004 and 2007; Statistics Canada, *Survey on Financing and Growth of Small and Medium Enterprises*, 2012.

A complementary measure that also provides insight into loan cyclicality patterns in Canada is the Bank of Canada's *Senior Loan Officer Survey*. This is an opinion-based survey that gathers information on business lending conditions based on the views of senior loan officers within selected Canadian financial institutions. Officers are asked to report whether lending conditions tightened, remained unchanged or eased over the previous quarter and responses are aggregated into a balance-of-opinion indicator (Figure 2). The measure indicates the direction of change in lending conditions and the amount of agreement among loan officers.

Figure 2: Business lending conditions—balance of opinion



Source: Bank of Canada, *Senior Loan Officer Survey*, 2000–2012.

Consistent with Statistics Canada and Industry Canada survey findings, there was tightening in lending conditions in 2001 following bursting of the IT bubble and the 9/11 attacks. Conditions remained tight through 2003. Conditions eased in 2004 and remained loose through 2007 as economic growth and rising interest rates led lenders to loosen their underwriting standards. Turmoil in credit markets worldwide and faltering economic activity triggered a period of tightening in late 2007.[1] This continued through to 2008 as a recession unfolded and to a lesser extent throughout most of 2009. It was observed in both price (e.g., interest rates) and non-price terms (e.g., collateral, covenants, etc.). As the economy recovered in 2010, competition among lenders intensified and lending conditions returned to a state of easing.

The biggest limitation of much of this Canadian survey data is that the data cover a relatively short time series and capture only one cyclical period. For the purpose of the regression analysis that follows, this limitation is overcome through the use of the BFSD, which contains outstanding business loan data going back to 1988.

In summary, a review of the literature provides some evidence of cyclical dimensions in business lending. International econometric studies show conflicting evidence regarding the cyclicality of lending for small businesses, with the significance of results varying across countries. Lending to medium-sized businesses,

1. While conditions may have tightened relative to 2006, Figure 1 confirms that lenders continued to lend: 94.4 percent of small businesses were still able to access the debt financing requested in 2007.

however, appeared to be consistently statistically significantly related to GDP growth, with a lag, but did not appear to be statistically significantly related to most other macroeconomic variables.

III. Empirical Framework for Regression Analysis

In this section, a framework for regression analysis to assess the business cycle effects on lending activities in Canada is presented. The analysis covers lending by Canadian chartered banks over the 1988–2012 period.

Data and Model Variables

This section provides an explanation of the data and variables used in the regression model. The underlying purpose of the regression analysis is to better understand changes across business size categories and over time in Canadian business lending activities.

Dependent Variable

The primary source of financing to businesses examined in the study is non-mortgage loans, to individuals and other non-financial businesses, for business purposes. All financing data from 1988 to 2012 come from the Bank of Canada's BFSD (for more details on the data sources used in this study, see Annex A).

The study concentrates on net business loans issued by chartered banks. Chartered banks represent the largest supplier of credit to businesses in Canada, supplying approximately 54 percent of total business debt (Statistics Canada, 2010). The study concentrates on bank loans to small, medium-sized and large businesses, as defined by loan authorization levels:[2]

- Small businesses—businesses with loan authorization levels less than $500,000;
- Medium-sized businesses—businesses with loan authorization levels between $500,000 and $5 million; and
- Large businesses—businesses with loan authorization levels greater than $5 million.

2. Loan authorization levels represent the standard upon which businesses are defined in the financial services industry in Canada. According to the Canadian Bankers Association, banks define small businesses as those having authorized credit limits of $500,000 or less.

The dependent variable is defined as the quarterly net change in log outstanding loan balances as reported on chartered bank balance sheet asset accounts (which measures the percentage change in outstanding loan balances). This is consistent with the approach taken by Covas and Hann (2006). It is important to emphasize that by focusing on changes in outstanding loan balances, the analysis does not identify whether changes in lending activities are driven by supply and/or demand; rather, the analysis demonstrates the loan cyclicality of "market clearing" financing levels. Separate data on the demand for and supply of loans are not available.[3]

Explanatory Variables

The primary explanatory variable of interest allows for an assessment of the effects of the business cycle on business lending. It is measured through changes in the output gap. The output gap is an economic measure of the difference between the economy's actual output and the level of output that could be achieved if running at full capacity. A positive output gap arises when actual output exceeds full capacity output, such as during the mid-to-late stages of an economic expansion or during the early-to-mid stages of a decline. A negative gap arises when actual output is less than full capacity output, such as during the mid-to-late stages of an economic decline or the early-to-mid stages of a recovery.

For the purpose of this study, the output gap is measured as the difference between log Nominal GDP and a Hodrick–Prescott (HP) filtered trend in log Nominal GDP.[4] The relationship between the output gap and the dependent variable should reveal whether business lending is cyclical. If it is discovered that business lending is cyclical, there should be a positive relationship between changes in the output gap and growth in outstanding loan balances.

3. It has been industry convention in the Canadian financial services industry for chartered banks, and other lending institutions, to report on only outstanding loan balances, which are influenced by gross loan disbursements as well as loan repayments, defaults and prepayments. This makes it difficult to disentangle whether changes in outstanding loan balances are driven by supply-side forces or demand-side forces. Starting in 2011, efforts have been made through Statistics Canada's *Biannual Survey of Suppliers of Business Financing* to gather data on chartered bank gross loan disbursements. This represents a more exact measure of loan supply and will become a key series studied in the future. Data show that gross loan disbursements generally move in tandem with changes in outstanding loan balances.

4. A Hodrick–Prescott filter is a mathematical tool used by macroeconomists in real business cycle theory to separate the cyclical component of a time series from raw data. It is used to obtain a curved representation of a time series, one that is sensitive to both long-term and short-term fluctuations.

In addition to the output gap, other factors with the potential to influence the supply and demand for loans—interest rates, savings rates, population growth rates, investment rates, bank profitability, bank capitalization rates and technological advances—have also been included. Each variable and its anticipated effect on market clearing financing levels is discussed below.

- The prime interest rate ($Prime_t$) is used to assess the effects of a change in interest rates on loans. The prime rate represents the rate lenders are willing to accept to lend funds to Canada's highest credit quality borrowers. A higher rate makes it more attractive to lend credit, but less attractive to borrow credit. This should lead to an increase in the supply of, but a decrease in the demand for, loans. The dominant side (demand or supply) will be reflected in the coefficient.
- The investment rate (Inv_t) is defined as total national investment as a percentage of GDP. The rate indicates the extent to which Canadian businesses have invested in physical capital—property, plant and equipment. Because the need for financial capital stems from the need for physical capital, a higher investment rate should correspond with a higher demand for loans (Parkin and Bade, 2000).
- The savings rate ($Save_t$) is defined as total national income less expenditures on taxes and consumption as a percentage of national income. Most chartered bank lending activities first require depository resources. A higher savings rate should translate into higher deposits and an overall increase in the supply of loans through the money multiplier process. However, because higher savings rates can correspond with expectations of lower levels of economic activity, income and investment, and so decrease the demand for physical capital, it is possible that a higher savings rate can correspond with a decrease in the demand for loans. The sign and statistical significance of the coefficient should reveal whether one effect dominates.
- As the size of the population (Pop_t) increases, so too does the demand for goods and services. As the demand for goods and services increases, so too does the demand for financing needed by firms to support the production/delivery of those goods and services. Therefore, an increase in the population growth rate should translate into an increase in the demand for loans.

- Profit growth ($Profit_t$) provides a means by which to convert current income into future lending. It is generally assumed that the more profitable a bank becomes, the more capital it has available to lend. However, to increase lending, the bank must retain its profits rather than distribute them to shareholders in the form of dividends or share repurchases. The relationship between bank profitability, retention rates and lending is complex. If banks retain a smaller proportion of their income the more income they generate, increased bank profitability might not translate into additional loans. Whether profit growth has led to additional lending will be reflected in the coefficient.
- The fraction of a bank's total assets that are held as equity represent its capitalization rate (Cap_t). The capitalization rate increases when the bank makes and retains profits or raises equity. The capitalization rate decreases when the bank incurs losses, writes off non-performing loans, pays dividends or repurchases the company's stock. Whenever a bank's capitalization rate increases, it is generally capable of making more loans. Consequently, a positive relationship between bank loans and capitalization rates is expected.
- A measure of total factor productivity from Canada's national productivity accounts is used to proxy for technological progress ($Tech_t$). Technological progress can result in an increase in the demand for certain types of goods and services and a decrease in the demand for others, the net effect being an increase or decrease in the demand for loans needed to purchase those goods and services. The sign and statistical significance of the coefficient should reveal whether the net effect is positive or negative.

For most of these variables it was possible to collect data from the first quarter of 1988 to the first quarter of 2012. For the measure of technological progress (*Tech*), quarterly total factor productivity data were not available and, consequently, data were converted from annual to quarterly using cubic spline interpolation.[5] For more details about the exact data series used to conduct the study, please refer to Annex A. At this time it is also worth mentioning that many of the series were non-stationary.

5. Cubic spline interpolation is a low-degree polynomial curve fitting approach that converts new data points from known data points, or unknown quarterly data from known annual data. As it is still an interpolation method, however, the resulting (*Tech*) series should be considered as suggestive rather than as a true series.

Data transformations for non-stationary series were performed using first differences (*D*), using second differences (*DD*) or by differencing the log values of the series (*DLn*). What transformations were performed are visible in the regression outputs.[6]

Estimation Strategy

In estimating the regression models, it is hypothesized that changes in business loans from one period to another will depend on changes in the output gap:[7]

$$\ln(BL_t) - \ln(BL_{t-1}) = \gamma((\ln(GDP_t) - \ln(GDP_t^N)) - (\ln(GDP_{t-1}) - \ln(GDP_{t-1}^N))) \qquad (1)$$

where BL_t is outstanding business loans in period t, GDP_t is Nominal GDP in period t and GDP^N is the "trend" in Nominal GDP. The parameter γ is expected to be positive, implying that when a positive output gap rises or a negative output gap falls, business lending increases—a falling positive output gap or rising negative output gap decreases business lending.

To write (1) in simpler notation, the change in log business loans will be denoted $DBL_t = \Delta\ln(BL_t) = \ln(BL_t) - \ln(BL_{t-1})$. The deviation of log GDP from its HP-filtered trend will be denoted $CY_t = \ln(GDP_t) - \ln(GDP^N)$, and the change denoted DCY_t. This represents the change in the output gap and is the main business cycle indicator. Including an error term, this yields:

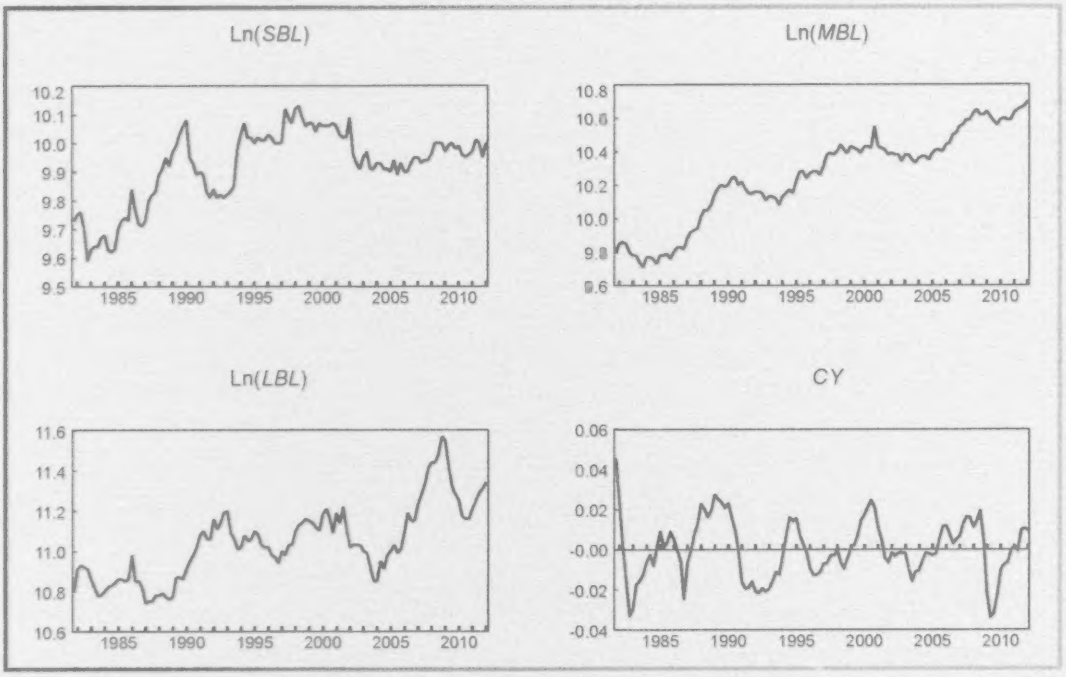
$$DBL_t = \gamma DCY_t + \varepsilon_t \qquad (2)$$

The time series for $\ln(BL_t)$ for small (SBL_t), medium-sized (MBL_t) and large (LBL_t) businesses are graphed in Figure 3. The time series for CY_t has also been graphed.

6. Cointegration tests were also performed; results were not statistically significant.

7. This analysis proceeds under the hypothesis of modern credit cycle theory, i.e., changes in the business cycle lead to changes in business lending. However, if lending fuels further business purchases (as is hypothesized under Austrian business cycle theory), presumably there will be further effects on economic activity and, consequently, on the business cycle (the model's main explanatory variable). For a follow-up study, it would be interesting to more directly model this possible two-way causal relationship using simultaneous equations.

Figure 3: Time series for the log of outstanding loan balances for small, medium-sized and large businesses and the deviation of log Canadian GDP from its HP-filtered trend



Sources: Bank of Canada, *Banking and Financial Statistics* Database, 1982–2012; Statistics Canada, *National Accounts*, 1982–2012; and author's calculations.

From Figure 3, the effects of economic fluctuations on business loans appear most evident towards the beginning of the sample period for small and medium-sized businesses. The effects of the financial crisis and economic recession near the end of the sample period appear most evident for large businesses. At this time it is worth noting that the series all appear to display some correlation.

Recognizing that changes in the output gap are likely to have a distributed-lag effect on business lending—not all of the effect of an upswing/downswing in the business cycle will take place instantaneously—equation (2) can be expanded to include lags of DCY_t. Further including an autoregressive component (lagged values of DBL_t), equation (2) becomes (with seven lags of DBL and DCY):

$$DBL_t = \gamma_1 DBL_{t-1} + \ldots + \gamma_7 DBL_{t-7} + B_1 DCY_t + B_2 DCY_{t-1} + \ldots + B_8 DCY_{t-7} + \varepsilon_1 \quad (3)$$

The current period effects of each explanatory variable as well as seven quarterly lagged effects were then included in the model and tested for statistical significance. Equation (4) expands on equation (3):

$$\begin{aligned} DBL_t = {} & \gamma_1 DBL_{t-1} + \ldots + \gamma_7 DBL_{t-7} + B_1 DCY_t + \ldots + B_8 DCY_{t-7} + \chi_1 Prime_t \\ & + \ldots + \chi_8 Prime_{t-7} + \delta_1 Save_t + \ldots + \delta_8 Save_{t-7} + \phi_1 Inv_t + \ldots + \phi_8 Inv_{t-7} + \varphi_1 Pop_t + \ldots + \varphi_8 Pop_{t-7} \\ & + \eta_1 Profit_t + \ldots + \eta_8 Profit_{t-7} + \nu_1 Cap_t + \ldots + \nu_8 Cap_{t-7} + \omega_1 Tech_t + \ldots + \omega_8 Tech_{t-7} + \varepsilon_t \end{aligned} \quad (4)$$

Model results and coefficient estimates for each explanatory variable in output Tables 2–5 and annex Tables B1–B3 represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all quarterly effects have elapsed. In other words, they represent the final effect from changes in all preceding periods (i.e., the interim multipliers). For example, an eight period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6+\beta_7+\beta_8)$. (Only coefficient estimates that were statistically significant were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.) Wald tests were then performed on the total impact multipliers to test the statistical significance of the coefficients (p-values are presented in the output tables).

IV. Correlation Analysis and Results of the Regression Analysis

Correlation Analysis

The analysis in what follows focuses on assessing the correlations among small, medium-sized and large business loan growth and lagged values of the explanatory variables to better understand how closely related the data series are. Table 1 presents current period and one-, two-, three- and four-period lagged correlations among variables. P-values of statistical test of significance are also presented.

Table 1: Correlations among small, medium-sized and large business loans and lagged values of the explanatory variables, 1988–2012

Variable	Small	Medium	Large
	DSBL	*DMBL*	*DLBL*
DCY	0.11	0.06	-0.07
	0.35	0.62	0.56
DCY(-1)	0.01	0.36***	0.35***
	0.92	0.00	0.00
DCY(-2)	0.08	0.33***	0.38***
	0.50	0.00	0.00
DCY(-3)	0.13	0.08	0.09
	0.24	0.46	0.42
DCY(-4)	0.17	0.11	0.07
	0.14	0.34	0.56
DPrime	-0.02	0.24**	0.21*
	0.83	0.03	0.06
DPrime(-1)	0.02	0.33***	0.19*
	0.85	0.00	0.09
DPrime(-2)	0.09	0.19*	0.10
	0.45	0.09	0.37
DPrime(-3)	0.15	0.02	0.10
	0.18	0.88	0.39
DPrime(-4)	0.08	0.10	0.13
	0.47	0.38	0.26
DSave	-0.01	0.10	-0.13
	0.94	0.36	0.24
DSave(-1)	0.08	0.16	0.14
	0.46	0.17	0.23
DSave(-2)	0.04	0.14	0.30***
	0.73	0.23	0.01
DSave(-3)	0.10	0.25**	0.16
	0.38	0.03	0.15
DSave(-4)	0.19*	0.00	0.01
	0.10	0.99	0.92
DDLn(POP)	-0.26**	-0.22**	-0.24**
	0.02	0.05	0.03
DDLn(POP(-1))	-0.06	-0.19*	-0.08
	0.61	0.08	0.50
DDLn(POP(-2))	0.21*	0.13	0.17
	0.06	0.23	0.12
DDLn(POP(-3))	0.17	0.31***	0.16
	0.13	0.00	0.17
DDLn(POP(-4))	-0.23**	-0.24**	-0.25**
	0.04	0.04	0.03

Variable	Small	Medium	Large
	DSBL	*DMBL*	*DLBL*
DLn(Tech)	0.08	0.16	-0.07
	0.47	0.15	0.55
DLn(Tech(-1))	0.08	0.15	0.00
	0.49	0.17	0.99
DLn(Tech(-2))	0.08	0.13	0.04
	0.46	0.25	0.72
DLn(Tech(-3))	0.07	0.08	0.04
	0.51	0.47	0.74
DLn(Tech(-4))	0.05	0.05	0.00
	0.67	0.66	0.99
DCAP	0.08	-0.03	-0.21*
	0.49	0.77	0.06
DCAP(-1)	-0.02	-0.12	-0.03
	0.84	0.30	0.78
DCAP(-2)	-0.07	-0.11	0.09
	0.52	0.31	0.44
DCAP(-3)	0.04	-0.08	-0.01
	0.70	0.48	0.91
DCAP(-4)	-0.17	0.06	-0.09
	0.13	0.61	0.42
Profit	0.36***	0.26***	-0.06
	0.00	0.01	0.55
Profit(-1)	0.02	0.29***	-0.06
	0.84	0.01	0.56
Profit(-2)	0.05	0.29***	-0.2
	0.64	0.01	0.84
Profit(-3)	-0.05	0.21**	0.01
	0.67	0.04	0.91
Profit(-4)	-0.02	0.22**	0.06
	0.82	0.03	0.58
DInv	0.10	0.02	-0.02
	0.38	0.85	0.84
DInv(-1)	0.04	0.15	0.20*
	0.70	0.19	0.08
DInv(-2)	0.13	0.26**	0.16
	0.25	0.02	0.15
DInv(-3)	0.17	0.22**	0.25**
	0.12	0.05	0.03
DInv(-4)	0.05	0.17	0.28***
	0.64	0.14	0.01

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.
Sources: Bank of Canada, *Banking and Financial Statistics* Database, 1988–2012; Statistics Canada, *National Accounts*, 1988–2012; and author's calculations.

Over the 1988–2012 period, medium-sized and large business loan growth was significantly correlated with the output gap, with one- and two-period lagged correlations of 0.36 and 0.33 for medium-sized businesses and 0.35 and 0.38 for large businesses. Small business loan growth displayed no significant correlations with the business cycle. Changes in the prime interest rate and the national savings rate at different lags also had a significant relationship with medium-sized and large business loan growth.

Changes in the population growth rates and bank capitalization rates produced unclear results over the period. Growth in bank profitability was significantly correlated with medium-sized business loan growth, with a four-period lagged correlation of 0.22. It was not, however, correlated with large business loan growth and produced unclear results for small businesses.

What should be taken from this analysis? Perhaps the main conclusion is that the statistical significance of the relationships among variables is less clear than what some might expect. Results are sensitive to the lagged correlation calculated. A second conclusion is that in assessing business loan cyclicality it is important to distinguish among small, medium-sized and large firms. In the next section it will become clearer for which businesses lending is most cyclically sensitive.

Also, in assessing these findings, it is important to keep in mind that, even though some variables might be correlated, changes in one variable do not necessarily cause changes in another. Econometric techniques were used to isolate the independent effects of each variable from the joint effects of all variables. Results are presented in the next section.

Results of the Regression Analysis

Below, regression results are presented separately for small, medium-sized and large businesses.

Small Businesses

Regression results for small businesses are presented in Table 2.

Table 2: Regression output explaining the quarterly percentage change in bank loans to small businesses, 1988–2012

Variable	Coefficient	Probability
DSBL	-0.220	0.025**
DCY	2.011	0.003***
DDLn(Pop)	5.513	0.058*
DLn(Tech)	-2.566	0.024**
DInv	4.431	0.003***
DCap	6.311	0.008***
Profit	-0.019	0.000***

R-squared	0.450	Mean dependent variable	0.000
Adjusted R-squared	0.388	Standard deviation dependent variable	0.037
Standard error of regression	0.029	Akaike information criterion	-4.127
Sum squared residuals	0.068	Schwarz criterion	-3.850
Normality test—Jarque–Bera (probability)	0.000	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.886
Functional form test—RESET2 (probability)	0.668	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	2.139	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	0.767	Observations (after adjustments)	90

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.
Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all eight quarterly effects have elapsed. For example, an eight period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6+\beta_7+\beta_8)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)
Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).

In this model there is a statistically significant relationship between small business loans and the business cycle. As expected, the sign of the beta coefficient is positive. The p-value is significant at the one percent significance level. The interpretation of the coefficient is as follows: a one-percent increase in the output gap (decrease in a negative output gap) would increase business loans to small businesses by about two percent, with the effect occurring within eight quarters.

The beta coefficient on the population variable is positive, as expected, indicating that an increase in the population growth rate would trigger an increase in the demand for financial capital as firms expand production to meet higher levels of consumer demand.[8] Bank profitability has a statistically significant, yet negligible, impact on small business lending. The investment rate and bank capitalization rate, however, are statistically significantly positive, with a one-percent increase in rates leading to a 4.4-percent increase and 6.3-percent increase in small business loans respectively.

It should be noted that the explanatory power of the model is fairly strong as measured by the R^2 values. The high Ramsey RESET p-value signals a good model fit and does not call for the inclusion of additional explanatory variables or for adjustments in functional form. Serial correlation and heteroskedasticity do not appear to be a problem and any multicollinearity present across variables does not appear to be harmful, with Variance Inflation Factors all below 10 (Hill et al., 2011). Recursive estimation also showed that stability was achieved in parameter estimates after about 20 quarters.

Medium-Sized Businesses

Regression results for bank loans to medium-sized businesses are presented in Table 3. Consistent with results for small businesses, the results show that there is a cyclical effect on loans to medium-sized businesses, i.e., current period and lagged changes in the output gap have a statistically significant positive relationship on bank loans. The effect is slightly lower for medium-sized businesses than for small businesses, with a one-percent increase in the output gap (decrease in a negative output gap) leading to an increase in medium-sized business loans of about 1.8 percent.

Results also show that changes in bank loans to medium-sized businesses depend positively on changes in national savings, with a one-percent increase in the savings rate resulting in a 0.89-percent increase in bank loans. This suggests that negative demand-side effects of an increase in the savings rate (reflecting

8. It is important to recognize that even a one-percent increase in the Canadian population growth rate (i.e., from two percent to three percent) would represent a "significant" increase.

expectations of lower levels of economic activity, income and investment) are offset by the positive supply-side effects of an increase in bank deposits and capital reserves.

Table 3: Regression output explaining the quarterly percentage change in bank loans to medium-sized businesses, 1988–2012

Variable	Coefficient	Probability
DMBL	0.227	0.011**
DCY	1.805	0.002***
DDLn(Pop)	12.333	0.000***
DLn(Tech)	-0.016	0.095*
DInv	2.522	0.002**
DSave	0.885	0.001***
DCap	-2.918	0.099*
Profit	-0.003	0.022**

R-squared	0.407	Mean dependent variable	0.006
Adjusted R-squared	0.357	Standard deviation dependent variable	0.032
Standard error of regression	0.025	Akaike information criterion	-4.426
Sum squared residuals	0.053	Schwarz criterion	-4.206
Normality test—Jarque–Bera (probability)	0.000	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.190
Functional form test—RESET2 (probability)	0.058	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	2.404	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	0.449	Observations (after adjustments)	91

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.
Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all eight quarterly effects have elapsed. For example, an eight period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6+\beta_7+\beta_8)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)
Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).

As with small businesses, the beta coefficients on changes in the investment rate and population variables are statistically significant and positive, as expected. The beta coefficient on bank profitability growth is also statistically significant, but has a negligible impact on bank loans. Surprisingly, the beta coefficient on bank capitalization rates was negative, though the relationship has low statistical significance at the 10 percent significance level.

Therefore, from this analysis it is possible to conclude that there are significant relationships between the business cycle, as measured by the output gap, and small and medium-sized business lending, i.e.,

lending to businesses of both sizes is almost equally cyclical, with the effect of the business cycle emerging within eight quarters.

Large Businesses

Regression results for large businesses are presented in Table 4. The output gap is significantly related with bank loans. Again, model results were derived with a lagged effect, meaning that the stimulative effect on bank lending of an upswing or downswing in the business cycle does not occur immediately. It occurs over a period of about eight quarters. The cyclical effect appears stronger for large businesses compared with small and medium-sized businesses,[9] with a one-percent increase in the output gap (decrease in a negative output gap) leading to a 2.8-percent increase in loans to large businesses.[10]

Results of this magnitude suggest that large businesses are more sensitive to business cycle fluctuations than small and medium-sized businesses. This result might be attributed to government assistance programs aimed at improving SME access to financing during economic downturns to fight cyclicality that are not available for large businesses. One mechanism for this is the government's Canada Small Business Financing Program (CSBFP). This is an SME-focused loan loss sharing program that transfers default risk from lenders to government to encourage lending to SMEs. Another mechanism is the Business Development Bank of Canada (BDC). More is said about the BDC in the text box below.[11]

The change in the business prime rate is also statistically significant at the 10 percent significance level. The positive sign indicates that the supply-side effect of an increase in the interest rate dominates the demand-side effect, i.e., the positive effect of an increase in the supply of loans resulting from an increase

9. Supplemental significance tests, assuming equal and unequal variances, were performed to test the difference between the output gap beta coefficients between small and medium-sized businesses, and between large businesses and small and medium-sized businesses. Test results confirmed that the beta coefficients were significantly different at the five percent significance level.

10. It is also important to note that this analysis relates to changes in the output gap while holding all other factors constant. In reality, the joint effect of an economic downturn with simultaneous changes in investment rates, savings rates, profitability and bank capitalization rates could have interaction effects on lending rates.

11. Efforts were made to test statistically the extent to which the CSBFP has worked counter-cyclically. Data showed that, while the correlations between the percentage change in newly insured CSBFP small business loans and lagged values of nominal GDP growth between 1982 and 2011 were generally negative, the correlations were not statistically significantly different from zero. This means that the value of loans insured through the CSBF Program do not appear to be strongly positively or negatively related to the state of the economy.

in the interest rate offsets the negative effect of a decrease in loan demand. Essentially, a one-percent increase in the prime rate corresponds with a 1.5-percent increase in large business loans outstanding.

Table 4: Regression output explaining the quarterly percentage change in bank loans to large businesses, 1988–2012

Variable		Coefficient	Probability
DCY		2.822	0.013**
DPrime		1.553	0.060*
DDLn(Pop)		8.313	0.041**
DLn(Tech)		-3.23	0.048**
DInv		4.057	0.003***
DCap		5.456	0.084*
R-squared	0.289	Mean dependent variable	0.006
Adjusted R-squared	0.241	Standard deviation dependent variable	0.052
Standard error of regression	0.045	Akaike information criterion	-3.260
Sum squared residuals	0.181	Schwarz criterion	-3.092
Normality test—Jarque–Bera (probability)	0.823	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.537
Functional form test—RESET2 (probability)	0.597	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	2.090	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	1.000	Observations (after adjustments)	95

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.
Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all eight quarterly effects have elapsed. For example, an eight period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6+\beta_7+\beta_8)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)
Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).

It should be noted that the negative demand-side effect of an increase in interest rates might be lower than what some observers expect. This is because higher interest rates commonly correspond with higher levels of economic activity and business profitability, which act as a natural hedge against higher financing costs and allow many businesses to maintain or even grow their loan demand even in rising interest rate environments.

The beta coefficients on changes in the investment and bank capitalization rates were significant and positive, with a one-percent increase in each, while holding all other factors constant, increasing bank loans by

4.1 percent and 5.5 percent respectively. As with small and medium-sized businesses, bank profitability growth had a negligible effect and did not produce statistically significant results.

BDC and loan counter-cyclicality

The BDC is a federal Crown corporation that delivers financial services, including secured and unsecured loans, subordinate financing, venture capital and business consulting services. The bank is mandated to support entrepreneurship and SMEs by operating as a complementary lender in the marketplace, offering loans and investments that supplement or complete services available from private sector financial institutions. To test statistically whether the BDC operates as a counter-cyclical lender, it was possible to redo the regression analysis using BDC data from the second quarter of 1996 to the first quarter of 2012 (Table 5).[12]

Table 5: Regression output explaining the quarterly percentage change in bank loans to SMEs—beta coefficients, 1996–2012

	Coefficient	Probability
Small	-0.505	0.085*
Medium	0.158	0.189
Large	1.46	0.196

* Significant at the 10-percent level.

For small businesses, results indicate that during economic downturns, a one-percent decrease in the output gap (increase in a negative output gap) will actually trigger a 0.5-percent increase in small business lending from the BDC. BDC lending to medium-sized and large businesses, however, showed no apparent statistically significant relationship with the business cycle. In fact, lending to medium-sized and large businesses over the last business cycle has showed continued growth during both the upturns and the downturns (see Figure B1, Annex B).

12. All data come from BDC internal accounts. The dependent variable in the regression analysis was defined as the quarterly net change in log outstanding loan balances as reported by the BDC. Small businesses were defined as those with loan authorization levels less than $250,000, medium-sized businesses were defined as those with loan authorization levels between $250,000 and $5 million, and large businesses were defined as those with loan authorization levels greater than $5 million. To ensure a reasonable number of degrees of freedom, five lags were included for each variable and tested for statistical significance instead of seven lags as in the other regressions. For these and other reasons, including the fact that the BDC data series is built using a shorter time series reflecting only one economic cycle, the BDC's regression results are not perfectly comparable with the regression results for chartered banks. (For full regression results see Annex B.)

V. Conclusions

The econometric analysis presented in Part IV provided evidence of linkages between the business cycle, as measured by the output gap, and business lending, with a positive relationship between bank loans and the output gap for businesses of all size categories. The period of analysis covered Q1 1988 to Q1 2012. The degree of cyclicality in bank lending appeared strongest for large businesses, with a one-percent increase in the output gap (or decrease in a negative output gap) leading to an almost three-percent increase in large business loans. This compared with an approximate two-percent increase in loans for small and medium-sized businesses.

The data did not allow for the separation of loan demand from loan supply. Improved data collection efforts on chartered bank lending by Statistics Canada through the *Biannual Survey of Suppliers of Business Financing* will allow additional time series to be built in the future and will allow for greater segregation of demand- and supply-side forces and improve our understanding of loan cyclicality.

One may ask what these results mean for policy-makers. The econometric analysis showed that lending to businesses is cyclical and, given that the economy is currently in a period of recovery, lending should be rising. In fact, data from Statistics Canada's *Biannual Survey of Suppliers of Business Financing* show that loans disbursed to businesses have increased from $61.5 billion in the first half of 2011 to $73 billion in the first half of 2013.

The results also support actions by governments to help stimulate lending during economic downturns to counteract the cyclical effects, i.e., as lenders become more risk averse and hesitant to provide loans during a downturn, the governments' role in improving access to financing becomes far more important.

Historically, public policy actions have focused on increasing lending to businesses during economic downturns. The monetary authority typically cuts interest rates and increases the supply of money to increase bank reserves and stimulate lending. The government aims to cut the budget deficit to lower

long-term interest rates and stimulate investment. Tax rates on capital formation are often reduced and tax-exempt savings plans introduced to encourage savings. When these policies succeed, the economy sees increases in both the supply and/or demand for funds.

Other government programs discussed here include the CSBFP and the BDC. Analysis suggests that the BDC can be effectively used to soften the impact of cyclical downturns on small business access to financing and, consequently, could do so again to stimulate lending. The results for the CSBFP are less clear, perhaps due to the interplay between government stimulus and private sector lender delivery of the program.

Furthermore, while recognizing that bank loans represent one source of total SME financing (e.g., there is also equity financing and lease financing), they represent the largest source of financing relied upon by Canada's youngest, most growth oriented and most innovative businesses (Industry Canada, 2013).[13] These businesses play a vital role in stimulating the economy and creating jobs. It is notable that policy-makers were quite responsive during the last financial crisis and injected additional capital into the BDC and raised maximum loan guarantee thresholds to support capital availability. Moving forward it will be important for the governments to devise mechanisms that support flows to businesses through the various types of financing.

13. Data from the 2011 Statistics Canada *Survey on Financing and Growth of Small and Medium Enterprises* showed that $23.5 billion in debt financing was supplied to SMEs compared with $2.5 billion in lease financing and $2.3 billion in equity financing.

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Annex A: Data Sources

Presented below are the key sources used to build the necessary data series for the correlation and regression analyses.

Outstanding bank loans to small, medium-sized and large businesses

Source: Chartered banks, regional distribution of selected assets and liabilities, at end of period, Canada, provinces and international. Statistics Canada, CANSIM Table 176-0074.

Output gap

Source: Gross domestic product at market prices, expenditure-based. Statistics Canada, CANSIM Table 380-0084.

Savings rate

Source: Current and capital accounts—National. Statistics Canada, CANSIM Table 380-0071.

Canadian population

Source: Estimates of population, Canada, provinces and territories. Statistics Canada, CANSIM Table 051-0005.

Bank profits

Source: Quarterly balance sheet and income statement, by North American Industry Classification System (NAICS). Statistics Canada, CANSIM Table 187-0001.

Capitalization rate

Source: Quarterly balance sheet and income statement, by North American Industry Classification System (NAICS). Statistics Canada, CANSIM Table 187-0001.

Technological progress (total factor productivity)

Source: Multifactor productivity, value-added, capital input and labour input in the aggregate business sector and major sub-sectors, by North American Industry Classification System (NAICS). Statistics Canada, CANSIM Table 383-0021.

Prime interest rate

Source: Financial market statistics. Statistics Canada, CANSIM Table 176-0043.

Investment rate

Source: Gross domestic product at market prices, expenditure-based (business gross fixed capital formation). Statistics Canada, CANSIM Table 380-0084.

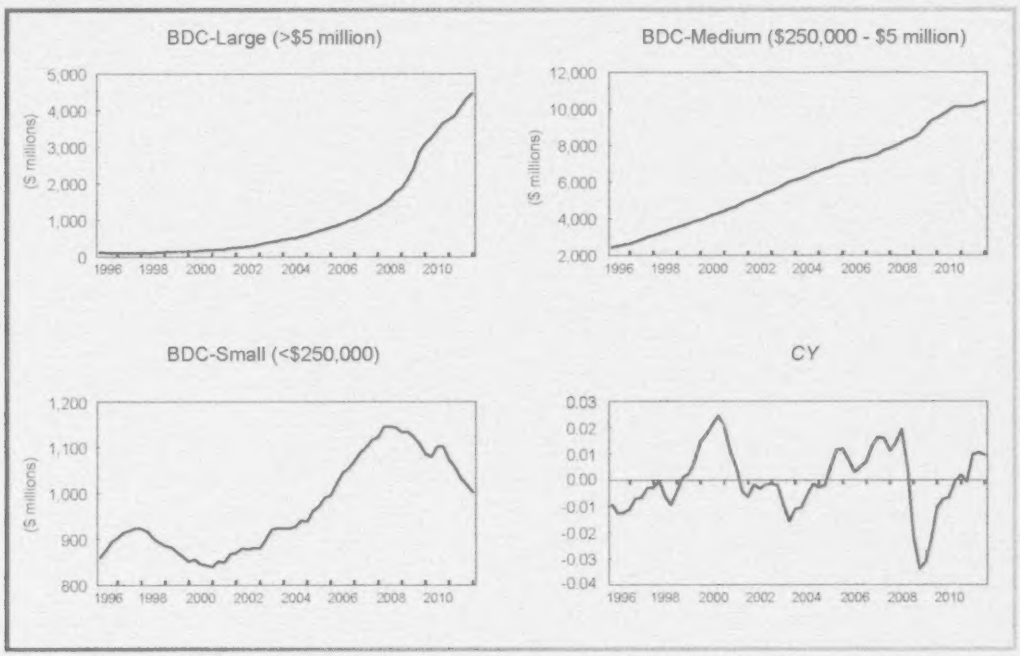
Outstanding BDC loans to small, medium-sized and large businesses

Source: Outstanding by total closely related commitment size. Business Development Bank of Canada internal accounts.

Annex B: BDC Loan Cyclicality (Regression Analysis)

Regression results assessing the cyclicality of the BDC's loan portfolio are presented below. Figure B1 graphs the time series for outstanding business loans to small, medium-sized and large businesses as well as the main business cycle indicator over the 1996–2012 evaluation period. From the figure it is clear that only small business lending appears to have a relationship with the business cycle, with loans to medium-sized and large businesses growing continuously over the period. Tables B1–B3 confirm these results using regression analysis. Only for small businesses is it possible to reject the null hypothesis that the beta coefficient on the output gap equals zero in favour of it being statistically significantly less than zero. This suggests that over the 1996–2012 period BDC loans to medium-sized and large businesses were not strongly positively or negatively related to the state of the economy.

Figure B1: Time series for outstanding loan balances for small, medium-sized and large businesses and the output gap



Sources: BDC, internal accounts; Statistics Canada, *National Accounts*, 1996–2012; and author's calculations.

Table B1: BDC regression output explaining the quarterly percentage change in bank loans to small businesses, 1996–2012

Variable	Coefficient	Probability
DBDCSBL	0.761	0.000***
DCY	-0.505	0.085*
DSave	0.326	0.018**
DDLn(Pop)	3.995	0.000***
DCap	-0.124	0.094*

R-squared	0.556	Mean dependent variable	0.002
Adjusted R-squared	0.507	Standard deviation dependent variable	0.013
Standard error of regression	0.009	Akaike information criterion	-6.453
Sum squared residuals	0.004	Schwarz criterion	-6.210
Normality test—Jarque–Bera (probability)	0.811	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.213
Functional form test—RESET2 (probability)	0.454	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	1.845	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	0.399	Observations (after adjustments)	61

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.

Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all six quarterly effects have elapsed. For example, a six period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)

Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).

Table B2: BDC regression output explaining the quarterly percentage change in bank loans to medium-sized businesses, 1996–2012 (HAC standard errors and covariance)

Variable	Coefficient	Probability
DBDCMBL	1.000	0.000***
DCY	0.158	0.189
DSave	-0.116	0.038**
DDLn(Pop)	5.786	0.000***
DCap	-1.308	0.013**
Profit	-0.013	0.004***

R-squared	0.720	Mean dependent variable	0.023
Adjusted R-squared	0.684	Standard deviation dependent variable	0.011
Standard error of regression	0.006	Akaike information criterion	-7.247
Sum squared residuals	0.002	Schwarz criterion	-6.973
Normality test—Jarque–Bera (probability)	0.388	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.074
Functional form test—RESET2 (probability)	0.634	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	2.517	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	0.026	Observations (after adjustments)	62

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.

Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all six quarterly effects have elapsed. For example, a six period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)

Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).

Note 3: Heteroskedasticity and serial correlation in the error term were found to be statistically significant at the 10 percent significance level; consequently, "heteroskedasticity and autocorrelation consistent (HAC)" robust standard errors were used to test the statistical significance of the beta coefficients (Defusco et al., 2009) represented by the p-values in the output table.

Table B3: BDC regression output explaining the quarterly percentage change in bank loans to large businesses, 1996–2012 (HAC standard errors and covariance)

Variable	Coefficient	Probability
DBDCLBL	0.863	0.000***
DCY	1.458	0.142
DSave	-0.974	0.002***
DInv	-5.686	0.000***
Profit	0.042	0.001***

R-squared	0.099	Mean dependent variable	0.064
Adjusted R-squared	0.013	Standard deviation dependent variable	0.045
Standard error of regression	0.045	Akaike information criterion	-3.284
Sum squared residuals	0.103	Schwarz criterion	-3.071
Normality test—Jarque–Bera (probability)	0.065	Heteroskedasticity test—Breusch–Pagan–Godfrey (probability)	0.114
Functional form test—RESET2 (probability)	0.101	Multicollinearity test—Variance Inflation Factors	<10
Durbin–Watson statistic	1.372	Recursive estimation	Stable
Serial correlation test—Breusch–Godfrey (probability)	0.056	Observations (after adjustments)	58

* Significant at the 10-percent level, ** significant at the 5-percent level, *** significant at the 1-percent level.
Note 1: Coefficient estimates for each explanatory variable represent total impact multipliers, i.e., they measure the final effect on business loan growth of a unit increase in an explanatory variable after all six quarterly effects have elapsed. For example, a six period total multiplier capturing the final effect on business loan growth of a one-percent increase in a positive output gap (decrease in a negative output gap) is $(\beta_1+\beta_2+\beta_3+\beta_4+\beta_5+\beta_6)$. (Only coefficient estimates that were statistically significant, however, were included in the final calculations. Coefficient estimates, and variables, that were insignificant were suppressed.)
Note 2: Wald tests were performed on total impact multipliers to test the statistical significance of the coefficients (represented by the p-values in the output table).
Note 3: Serial correlation in the error term was found to be statistically significant at the 10 percent significance level; consequently, "heteroskedasticity and autocorrelation consistent (HAC)" robust standard errors were used to test the statistical significance of the beta coefficients (Defusco et al., 2009) represented by the p-values in the output table.